

# Polymer stabilized nanogold as tracer to use in co-injection with nZVI during insitu DNAPL remediation

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## Abstract

**TITLE:** Polymer stabilized nanogold as tracer to use in co-injection with nZVI during in-situ DNAPL remediation

**Abstract Body:** Nanoscale zero-valent iron (nZVI) particles have emerged as an efficient remediation agent for aqueous environmental pollutants such as chlorinated solvents and potentially dense non-aqueous phase liquids (DNAPLs) accumulated in the subsurface. For in-situ applications, the colloidal stability required for subsurface mobility of nZVI is achieved by surface modification using different stabilizers. However, tracing the fate of the mobile nZVI in the subsurface is challenging and in most of the field tests, the reach of nZVI at the contaminated zone is determined by total iron concentration analysis that fails to distinguish between nZVI particles and dissolved iron ($Fe^{2+}$) from corrosion. Efficient tracing methods are therefore of interest as the area of influence is important in determining the effectiveness of the remediation process and assessing the dispersion of such reactive nanoparticles in the environment.<br />
To improve this tracing mechanism, the possibility of introducing nanogold (nAu) particles as a tracer with the reactive nZVI particles is investigated. Moreover, it is much easier to study mobility and partitioning properties of nAu than nZVI, coated with the same polymers, since the latter demands anaerobic conditions. Hence in this study, we use nAu particles as a model system to study their behavior when coated with certain amphiphilic block co-polymers (PVA-COOH and PVP-VA) and also to investigate the fate of nanoparticles in porous media. The mobility, traceability, affinity towards PCE and TCE and spectrophotometric characterizations of nAu are studied in laboratory batch, column and 2D flow cell experiments.

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